

IN THE SPECIFICATION

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B, This application claims the benefit of U.S. Provisional Application Serial No. 60/360,323, filed February 26, 2002, entitled Endovascular Grafting Device, which contents are incorporated herein by reference in their entirety.

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B2 FIG. 1K is a partial perspective view ~~of a portion of the area designated by the dotted lines in FIG. 1,~~ depicting a grommet used to reinforce the connector holes;

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B3 FIG. 1Z is a partial elevational view depicting a bulb inserted through a connector hole in a graft tab which is sutured to the main body component graft material;

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B4 The shape and direction of the attachment hooks 86 may be selected to provide optimal fixation within the lumen. FIG. 1C depicts an embodiment of a single attachment hook or barb 186 facing the distal direction, which is the direction of blood flow. The flow of blood will help embed the hook 86 186 in the lumen wall. FIG. 1D depicts an attachment hook 286 with a tail portion 98. The tail portion 98 increases the force with which the hook 86 286 contacts the lumen wall by reducing the amount of bending or rotation of the top of the hook 86 286 toward the center of the lumen away from the lumen wall. Such rotation tends to reduce the force with which the attachment hook 86 286 contacts the lumen wall, thereby resulting in less penetration and a weaker seal. FIG. 1E depicts an embodiment of bi - directional attachment hooks 386 which resist the tendency of the distally facing hook 86 386 to dislodge if the stent 40 is accidentally moved in the proximal direction by subsequent interventional procedures by a physician. FIG. 1F depicts a tapered attachment hook 486 which facilitates penetration

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B4 of the lumen wall. It is contemplated that the shape and direction of the hooks or barbs may be varied to improve attachment anytime axial fixation of a component is desired.

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B5 FIG. 1M depicts an embodiment of connector hanger 146 with a sharp edge to facilitate piercing the graft material. Note that the connector hanger 46 146 cutout 54 is widened near the midpoint of the hangers to allow the graft material to more easily surround the connector hanger 146 and, thereby, minimize graft wear. FIG. 1N depicts a connector hanger 246 with a rounded edge to facilitate engaging a connector hole 35 without tearing the graft material. FIG. 1O depicts an embodiment of a connector hanger 346 with a suture hole 69 at the distal end that facilitates attaching the connector hanger 346 to the graft material for additional support.

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B6 FIG. 3A shows an embodiment of a main body component 130 with additional stents 50, 51, 52, located inside the graft material at the neck 131, trunk 132, and limb support portions 133, 134 respectively. Hooks 86 may be provided if stent 50 is an attachment stent. Note that one limb support portion ~~133~~ 134 is shorter than the other limb support portion ~~134~~ 133. This facilitates a smaller delivery profile as the limb support portion stents 52 will not occupy the same axial space when the main body component 130 is compressed in a catheter sheath for delivery.

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B7 The attachment 40 and additional stents 50, 51, 52, 150, 151, 152 may be of any type known within the art. It is contemplated that both internal and external stents may be provided depending upon the patient's vasculature and delivery package size restrictions. FIG. 3C shows a main body component 130 with an additional internal stent 50 at the neck, additional internal 51 and external 151 stents at the trunk 132, and additional external stents 152 at the limb support portions. As shown in FIG 3C, a

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sealing region is defined by three rings of half cell stents (12 cells each), two of which are positioned on the inside of the main graft component 130 and the third on the outside, although other combinations of inside and outside stents are contemplated. It is also contemplated that there be a 2-3mm longitudinal space between the sealing stents of the main body and that the legs ~~132~~ 133, ~~133~~ 134, of the main body are sewn together. It is to be further noted that the fixation stent 40 is attached directly to the main body component 130 via tabs of graft (See FIGS. 1P-V and 1X-Z, for examples). Moreover, the main body graft component 130 can be formed so as to define a tapered profile in which the top of the graft is wider (has a larger inlet diameter) than the bottom of the graft (whose limb outlet diameters combined are less than the inlet diameter) as shown in FIGS. 3C-3E or a flared profile in which the bottom of the graft is larger than the top of the graft.

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As shown in FIG. 6A and 7B, a reduced profile delivery package may be facilitated by tapered stent struts 243, 43. By making the thickness of the stent struts 243, 43 smaller in the wishbone area 58 than in the cell joint area 59, the volume of the collapsed stent ~~340~~ 240, 55 may be decreased.

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Alternately, sutures and wires may provide additional support for the main body component 30. FIG. 9 depicts an embodiment of a main body component 130 with a stiffening wire 60, limb support portion suture loops 62, and limb support portion suture tether 63. The stiffening wire 60 is attached to the main body component 130 graft material by sutures 48 and provides support for a main body component 130 which is not fully-stented, having only an attachment stent 40. The suture loops 62 are attached inside the graft material of each limb support portion 133, 134 and facilitate attachment of the limb components by maintaining an open docking section for the limbs. The suture tether 63 connects the two limb support portions 133, 134 together and facilitates

catheterization of the contra-lateral limb support portion 134 by keeping it steady. For instance, if the main body component 130 is only partially-deployed by a delivery catheter (not shown) whereby only the shorter contra - lateral limb support portion 134 is freed, the delivery catheter maintains control of both the ipsi-lateral limb support portion 133 and contra-lateral limb support portion 134. Catheterization of the contra - lateral limb support portion 134 by a second catheter (not shown) is thereby facilitated.

Additional support may be achieved by an anti - twist wire 64 that is attached to the main body component 30 graft material. As shown in FIG. 10, the anti - twist wire 64 has the shape of the letter "U" with the open end of the "U" pointing toward the attachment stent 40 and the bottom of the "U" running through the crotch between the limb support portions 133, 134, such that the ends of the wire 64 are attached to opposite sides of the graft material by sutures 48. The presence of the anti - twist wire 64 resists twisting of the main body component 30 when its distal end is not supported by stents or attached within the ~~patients~~ patient's vasculature and thereby, facilitates attachment of the limb components.